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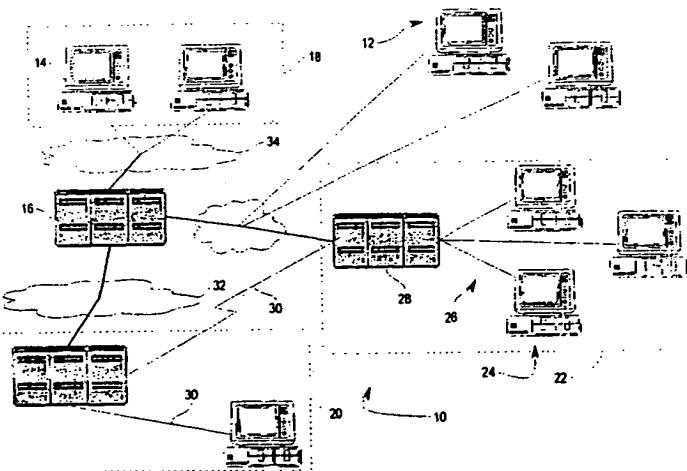
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(54) Title: **SYSTEM AND METHOD FOR INTERACTIVE MULTI-MODAL DISTANCE LEARNING**



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(57) **Abstract:** A system and method for providing educational information to a plurality of viewers include providing a plurality of programs accessible via a computer from a plurality of remote locations for selection by the viewers, processing viewer identification information to identify a viewer, selecting a method of payment for viewing a selected program, processing format information to select one of a plurality of predetermined transmission formats for the selected program, and initiating transmission of the selected program in the selected format to the computer of the viewer. In one embodiment, viewers access educational programming which is broadcast over one or more computer networks using video and audio streaming in conjunction with periodically transmitted graphical and textual information which is subsequently synchronized with the video and audio information. In one embodiment, the system and method provide an interactive component, which may be necessary for certain continuing education accreditation, using chat rooms and threaded discussion groups.

## SYSTEM AND METHOD FOR INTERACTIVE MULTI-MODAL DISTANCE LEARNING

### TECHNICAL FIELD

5 The present invention relates to systems and methods for interactive distance learning or instruction including streaming of multimedia information from a source to a distant user over a packet-based network.

### BACKGROUND ART

10 Many professionals are required to periodically obtain continuing education to maintain their licensing, certification, or simply to maintain their proficiency in their field(s) of expertise. Traditional continuing education programs include video tape presentations, satellite broadcasts, seminars and conferences, and the like. Typically, those seeking continuing education are required to travel to the location of an educational institution or to a remote location selected by educational service providers. This results in significant costs in terms of tuition, travel, meals and lodging, and lost productivity in terms of being absent from the workplace.

15 Furthermore, programs may only be offered once or twice each year which may result in selecting continuing education courses based on convenience or scheduling constraints rather than a desire or necessity to obtain relevant skills and information.

20 Medical, computer, legal, and numerous other professionals are encouraged or required by regulatory or governmental agencies or associations, or simply by the demands of the marketplace, to obtain continuing education.

25 For professions which are regulated or controlled by governmental or quasi-governmental agencies, compliance typically requires a certain minimum number of continuing education credits every two (2) to four (4) years, typically obtained from approved or accredited providers. Course content as well as the particular mode or method of providing the information may have to meet certain requirements for accreditation. For example, some states require physicians to obtain continuing medical education which must meet minimum content requirements

and include an interactive component which allows the physician to ask questions and/or share information and experiences.

5 To monitor compliance with continuing education requirements, the educational providers typically supply information relative to attendance and/or performance for enrollees to the designated agencies or organizations. The agencies may periodically require a certification of compliance or audit selected individuals to verify compliance with the continuing education requirements to maintain a license to practice or a particular accreditation.

10 As the number of certifications, accreditations, and licensed activities continues to increase, the need has developed for a cost-effective solution to providing easily accessible continuing education which meets various content and delivery requirements.

#### DISCLOSURE OF INVENTION

15 It is therefore an object of the present invention to provide a system and method for delivery of high-quality educational programming for professionals and para-professionals over local, wide, and global area networks.

Another object of the present invention is to provide a system and method for delivering interactive, on-demand educational programming over a computer network.

20 A further object of the present invention is to provide a system and method for multi-modal educational programming including textual, video, audio, and graphical presentation of information.

25 An additional object of the present invention is to provide a system and method for providing on-demand continuing medical education over a computer network which evaluates participants comprehension of material presented and

digitally transmits results to an appropriate educational institution, accreditation agency, and/or licensing authority.

Another object of the present invention is to provide a method for delivering multi-modal educational information to subscribers and via pay-per-view programming using streaming technology over a packet-switched network while 5 providing sufficient interactivity to remote users to qualify for continuing education credit through the use of chat rooms and threaded discussion groups.

In carrying out the above object and other objects, advantages, and features of the present invention, a system and method for providing educational 10 information to a plurality of viewers include providing a plurality of programs accessible via a computer from a plurality of remote locations for selection by the viewers, processing viewer identification information to identify a viewer, selecting a method of payment for viewing a selected program, processing format information to select one of a plurality of predetermined transmission formats for the selected 15 program, and initiating transmission of the selected program in the selected format to the computer of the viewer.

The present invention incorporates streaming technology with traditional multi-modal educational methods to present course materials in a systematic and efficient progression to provide cost-effective instruction or distance 20 learning over local area and wide area networks, such as the Internet. Integrated presentation of text, graphics, audio, and visual educational information with the opportunity for interactive discussion reinforces varied individual learning styles. Furthermore, the interactive capability afforded by the present invention is required 25 for educational programming to qualify for certain continuing education accreditation.

The above advantages and other advantages, objects, and features of the present invention, will be readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings.

**BRIEF DESCRIPTION OF DRAWINGS**

FIGURE 1 is a block diagram illustrating a system and method for interactive multimodal distant learning according to the present invention;

5 FIGURE 2 is a block diagram representation of one embodiment of an interactive multimodal distant learning system according to the present invention;

FIGURE 3 is a flow chart illustrating operation of a system or method for interactive multimodal distant learning according to the present invention; and

10 FIGURE 4 is a block diagram illustrating storage and subsequent synchronization of program content transmitted asynchronously according to the present invention.

**BEST MODE FOR CARRYING OUT THE INVENTION**

A block diagram illustrating a system and method for interactive multimodal distance learning according to the present invention is shown in Figure 1. System 10 includes a plurality of computers, indicated generally by reference numeral 12. Computers 12 include user computers 14 which preferably communicate with one or more organizational computers or servers 16. Preferably, several of computers 12 communicate via a packet switched computer network using one or more of the established communications protocols, such as TCP/IP. Preferably, computers 12 are remotely located in various geographic regions represented schematically as a first geographic region 18, a second geographic region 20, and a third geographic region 22.

25 Geographic regions 18, 20, and 22 may represent a particular state, country, city, or building. For example, geographic region 22 represents an organization having a number of member computers 24 which communicate via a local-area network (LAN) with a centralized organization server 28 to form a company or organization Internet. As well known in the art, various computer

networks may be formed using logical links or pointers to other computers connected using one or more LANs or other networks.

5                   Server 28 for a particular organization may be connected to one or more servers, such as server 16 via a direct connection, indicated generally by reference numeral 30. Alternatively, or in combination with the direct connection, server 28 may communicate with server 16 via a packet based network such as a wide-area network (WAN) or a global-area network such as the Internet, indicated generally by reference numeral 32.

10                  In one embodiment of the present invention, a centralized computer operating as a file server, such as server 16, includes a plurality of educational programs accessible via various other computers, such as computers 14 from various remote geographic locations, such as geographic regions 18, 20, and 22. Because of the wide variety of hardware and software platforms, including computers, operating systems, application programs, and browsers, the programming information is preferably provided in a plurality of predetermined transmission formats. A particular transmission format may be selected based on the application program used to access the information, or determined according to the connection speed between the computer and the server. Preferably, a selected educational program is transmitted in a selected format from server 16 to computer 14 or 24 or 15 a viewer/user to facilitate distance learning. Multimodal programming is preferred which includes video, audio, graphical, and textual information. The predetermined transmission formats preferably include various compression ratios and/or 20 technologies to accommodate the wide variety of connection speeds and platforms currently in use.

25                  A block diagram representation of one embodiment of an interactive multimodal distance learning system according to the present invention is shown in Figure 2. Functional diagram 50 provides a representative implementation of the system and method which may be implemented as a website on the Internet. Of course, various alternative arrangements of the functional blocks may be provided 30 according to the present invention. Database 54 preferably captures general log in

information represented by block 52. This information may include the viewer's email address, user ID, browser type, hardware type, and the path or link followed to arrive at the splash page represented by block 56. Log-in information 52 may be used to identify a referring organization or website as explained in greater detail below. Alternatively, log-in information 52 may be used to track various statistical parameters associated with the visitors to the website. This information is stored in database 54 and may be used in subsequent marketing and promotional activities.

In one embodiment, splash page 56 is customized using database 54 based on the particular log-in information 52. For example, a user following a link 10 from an affiliated website (or dialing a telephone number provided to a particular organization) may be presented with a corresponding interface or splash page which identifies the educational service as being affiliated with the user's organization. Alternatively, log-in information 52 may be used in conjunction with splash page 56 to provide a transparent user interface based on the referring or linking website or 15 computer. Preferably, splash page 56 includes various menu items represented generally by reference numeral 60. In one embodiment, menu items include an event listing 62, a topic table of contents 64, a catalog 66, marketing information 68, organizational information 70, a feedback form 72, and help screen 74.

In one embodiment of a distance learning system and method 20 according to the present invention, an event listing menu 62 provides a calendar or schedule of upcoming events which may include live simulcasts from educational conferences located at various locations around the world. Likewise, event listing 62 preferably includes a schedule or calendar for providing interactive content via access to educational program instructors. This access may be provided using chat 25 rooms, represented generally by reference numeral 80 and/or threaded discussions, represented by reference numeral 82.

Chat rooms 80 provide access to a program instructor or author via a shared location, preferably on a computer accessible by at least one viewer and the 30 instructor, to exchange information electronically. Threaded discussions 82 provide an electronic forum accessible via the computer for sharing information relative to

5 a particular program or a particular topic among viewers and/or instructors. The discussions are "threaded" in that responses are sorted by topic or previous response to facilitate viewer interaction. Depending upon the particular application, chat rooms 80 and threaded discussions 82 may be moderated by an instructor or personnel from the educational service to assure that educational integrity of the system is maintained.

10 As also illustrated in Figure 2, splash page 56 preferably provides access to a topic table of contents 64 which functions as a cross reference listing of topics 90 for various programming and live event information which may also be accessed via catalog 66 and event listing 62, respectively. Once a program is selected via topics 90 or catalog 66, the viewer/user login information is determined as represented by block 92. Preferably, the viewer may register as a guest and have access to a limited number of programs which provide a representative sample of the content and delivery options available through the system. Depending upon the 15 particular login information required at block 52, block 92 may simply access database 54 to verify that the viewer is a registered user and is allowed to proceed. Alternatively, additional information may be required by block 92. Registered users may proceed to a new topic and specific module or program as represented by blocks 94 and 96, respectively. Alternatively, users may search for a particular program. 20 topic, instructor, or practice area using search function 98.

25 Payment information, represented by block 100, may be determined depending upon the particular educational service and the viewer's membership or association with a group. Preferably, individual viewers may access some programs on a pay-per-view basis, while others are available only to subscribers or members of affiliated organizations. Pay-per-view (PPV) programs are preferably accessible for a predetermined period of time after selection and payment for the program to allow the viewer to pause and resume a program at a later date. For example, a PPV viewer would have access to the selected program on demand at any time within one week from the original purchase. In contrast, subscribers have access to a particular 30 educational program, group of programs, topic (including events), etc. for a longer predetermined period of time, such as for a year.

Payment module 100 of Figure 2 determines whether the viewer is a previously registered user or subscriber by searching an appropriate database, such as database 54 based on viewer identification information gathered passively or in response to associated prompts. The system may limit access to a subset of programs based on the viewer being a member of a particular organization or a previously registered viewer. For first-time registrants, appropriate payment information may be gathered, such as credit card information or identification sufficient to bill the viewer through a third-party billing service. If the user is associated with an organization affiliated with the educational information provider, the user may receive a discount or the organization may be billed for use of the system by the viewer. Preferably, the user enters identification information associated with membership of an organization and the organization is subsequently billed for access of the selected program by the user. For example, medical educational programming may be provided to patients in conjunction with out-patient procedures or pre-operative/post-operative care. The patient would enter insurance information and have access to educational programming associated with a pre-authorized procedure. Alternatively, members of a particular health maintenance organization (HMO) or similar organization may purchase a group subscription which provides access to various educational programming for their members.

Once a method of payment is selected as represented by block 100 of Figure 2, transmission of the selected program or module in the previously determined or selected transmission format is initiated as represented by block 102. As indicated above, the program information is preferably delivered via digital data over a packet-switched network which includes video, audio, graphical, and textual information. This multimodal approach takes advantages of various individuals' learning styles, strengths, and weaknesses. The viewer may interactively participate depending upon the particular type of programming (live broadcast, lecture, etc.) and time of viewing via threaded discussions 82 and chat rooms 80, for example. Preferably, streaming technology is used to provide the video and audio content while graphical and textual information is transmitted asynchronously at predetermined intervals based on the program content. As such, a predetermined portion of the selected program is transmitted and buffered on the computer of the

viewer prior to displaying the program. The video and audio information are then synchronized with the graphical and textual information to form an integrated presentation to the user, as illustrated and explained in greater detail with reference to Figure 4. Once display of the predetermined portion of the selected program begins, additional portions of the program are transmitted to the computer of the viewer to provide continuous, uninterrupted viewing of the information. This approach reduces the delay between selection of the program and actual viewing rather than transferring the entire program to the viewer's computer prior to viewing. This approach also makes it more difficult for users to capture and store the program which may result in unauthorized distribution and/or viewing.

With continued reference to Figure 2, block 68 represents marketing/promotional information accessible to the user. Such information may include various paid advertising and/or links to affiliated organizations as represented by block 110. Block 70 represents organization information which may include information about the educational service provider including qualifications, accreditations, and the like. Organizational information may also include background or biographical information on various sponsoring organizations and/or instructors as represented by block 120.

A feedback form, represented by block 72, may be used to provide feedback relative to various educational programs and/or the website in general. Feedback form 72 may be used to gather structured feedback, i.e. a survey or questionnaire, or may be used to elicit unstructured feedback in the form of comments or email. Block 74 represents a help function with associated files or information represented by block 130.

A flowchart illustrating control logic of one embodiment of a system or method according to the present invention is shown in Figure 3. As will be appreciated by one of ordinary skill in the art, the flowchart illustrated in Figure 3 may represent any of a number of known processing strategies such as event-driven, interrupt-driven, multi-tasking, multi-threading, parallel processing, and the like. As such, various steps or functions illustrated may be performed in the sequence

illustrated, in parallel, or in some cases omitted. Likewise, the order of processing is not necessarily required to achieve the objects, features, and advantages of the invention, but is provided for ease of illustration and description. Preferably, the control logic is implemented in software which is executed by a microprocessor-based computer. Of course, the control logic may be implemented in software, 5 hardware, or a combination of software and hardware. The flowchart of Figure 3 illustrates one "loop" and its operations are preferably repeated based on user and system actions. Likewise, each functional block may be performed repeatedly prior to, or in parallel, with processing of subsequent functional blocks. The functions 10 represented may be performed by separate application programs, applets, routines, and the like, by one or more processors or computers without departing from the spirit or scope of the present invention.

15 User identification information is captured by block 150 of Figure 3. This information may be entered directly by the user or may be captured by an affiliated site having a link followed by the user as represented by block 152. This 20 information may be subsequently used to provide billing of an affiliated association or organization based on the user being identified as a member of a particular group or organization.

25 A menu or program guide is presented as represented by block 154. The user interface presented to the user may be customized based on the user's organization or affiliation as represented by block 156. The user then selects a topic or course as represented by block 158. Preferably, available courses include standard or regular courses as represented by block 160, pay per view (PPV) courses as represented by block 162, and live courses, seminars, or presentations as represented by block 164. In one embodiment, courses also include premium courses, represented by block 166, and sample courses represented by block 168. The sample courses 30 168 are provided free of charge.

35 The user selects from modules as represented by block 180. Payment information may then be entered as represented by block 182. Depending upon the particular application, payment information may be gathered based on the user's

association or affiliation with an organization which sponsors the educational programming. Based on the user identification information entered during the login or registration process, the payment information may be automatically associated with the user. Alternatively, block 182 may determine that the user has already paid for a particular program or group of programs and is continuing a previously interrupted session in which case no additional payment information is required.

The selected program or module is then transmitted in an appropriate format as represented by block 184. The transmission format may be manually selected by the user or automatically determined by the system based on the user's browser, connection speed, previously defined preferences, or based on the program content. Preferably, transmission of the program includes a first block of information, represented generally by reference numeral 186, and a second block of information, represented generally by block 192. Preferably, block 186 is transmitted asynchronously relative to block 192. As illustrated, block 186 includes text information 188 and graphical information 190. Block 182 includes audio information 194 and video information 196. To reduce the delay or latency between selecting the program and viewing of the first frames or slides, the audio and video information represented by block 192 is preferably streamed to the computer of the viewer. As such, a predetermined portion of the selected program, i.e. a portion of the audio and video, is transmitted and buffered on the computer of the viewer prior to displaying the program. Additional portions of the program including audio and video information are then transmitted during display of the buffered portion. The text and graphical information represented by block 186 is asynchronously transferred and then synchronized with the presentation of the audio and video information as illustrated and described in greater detail with reference to Figure 4.

The present invention provides for viewer interaction as represented by block 200. Interaction may be provided during a particular module or segment or may be provided at the end of a particular module or segment. Viewer interaction may include the use of chat rooms and/or threaded discussion groups as represented by block 202. A chat room is particularly useful when the program is viewed during hours in which the instructor or lecturer is available. Preferably, the user and the

instructor have access to a common area to provide this functionality. The discussion forums may be threaded or sorted by author/instructor as represented by block 204 or may be sorted by topics or past discussions as represented by block 206. The viewer interaction provided by block 200 may also include a test or quiz used to determine the viewer's comprehension of the educational material presented. Results are then analyzed as represented by block 208. If the user has not achieved a predetermined level of comprehension as indicated by block 210, a review segment or module may be initiated as indicated by block 212. When the user has demonstrated proficiency with the material presented, the next module or segment is transmitted as indicated by block 214. Preferably, the user may pause or interrupt the presentation at any time as represented by block 216. Subsequent modules or segments may be presented by repeating one or more of the steps illustrated.

To facilitate continuing education credits, the results of any examinations or the completion of a particular segment or program is reported at block 218. This may include generation of a certificate as represented by block 220. Preferably, any certificate will have an appropriate audit or authenticity code unique to the user and/or program. The report or results may also be transmitted directly to an accreditation or licensing agency as represented by block 222.

Figure 4 illustrates a system and method for storage and subsequent synchronization of program content according to the present invention. As described above, various program content may be transmitted asynchronously to the viewer to reduce latency. For example, video and audio information may be transmitted separately from graphical slides, photographs, questions and answers, and/or supplemental information. The asynchronously transmitted information is then synchronized to provide a seamless, integrated presentation to the viewer. Preferably, the different types of program content are displayed in separate frames within the browser application of the viewer.

Various types or modes of program content for a particular program are preferably stored in bins, represented generally by reference numeral 250 of

Figure 4. The bins may represent directories or subdirectories on a disk, for example. Preferably, bins 250 include an audio/video bin 252, a slide bin 254, a photographic bin 256, and a questions/answers bin 258. Of course, various other bins may be provided depending on the particular programming being offered. Each 5 bin preferably includes a number of files, indicated generally by reference numeral 270, which may be asynchronously transmitted to the computer of the viewer. The files are used to store a segment of video 272 (and preferably associated audio), a slide or graphic 274, a photograph 276, or a group of questions and answers 278, for example. The various segments 272, slides 274, photographs 276, and 10 questions/answers 278 are then synchronized using a series of pointers or linked lists, indicated generally by reference numeral 280. Pointers 280 are used to associate a particular audio/video segment with corresponding slides, photos, and other material. As illustrated in Figure 4, a single video segment 270 may be associated with multiple slides 274. Likewise, various slides 274 may be associated 15 with multiple photographs 276 and/or questions 278. Similarly, a particular video segment 270 may be directly associated with one or more photographs 276, questions 278, or other material.

Use of pointers in combination with separately stored modules or segments of information according to the present invention greatly reduces the 20 traditional editing associated with a video presentation. This results in reduced costs to produce a particular program. The separately stored modules or segments also facilitate the asynchronous transmission of program content to reduce the latency between selection and viewing of a particular program or segment.

As such, the present invention provides a system and method for 25 delivery of high-quality educational programming for professionals and para-professionals over local, wide, and global area networks. By delivering high-quality video, audio, textual, and graphical information on-demand over a computer network, the present invention provides a cost-effective alternative to continuing education.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

5

**WHAT IS CLAIMED IS:**

- 1        1. A method for providing educational information to a plurality of  
2        viewers, the method comprising:
  - 3                providing a plurality of programs accessible via a computer from a  
4                plurality of remote locations for selection by the viewers;
  - 5                processing viewer identification information to identify a viewer;
  - 6                selecting a method of payment for viewing a selected program;
  - 7                processing format information to select one of a plurality of  
8                predetermined transmission formats for the selected program; and
  - 9                initiating transmission of the selected program in the selected format  
10              to the computer of the viewer, the transmission including video, audio, graphical,  
11              and textual information.
- 1        2. The method of claim 1 further comprising:
  - 2                eliciting responses from the viewer; and
  - 3                processing the responses to evaluate viewer comprehension of the  
4                transmitted program.
- 1        3. The method of claim 1 further comprising:
  - 2                providing access to a program instructor for the selected program via  
3                the computer.
- 1        4. The method of claim 3 wherein providing access comprises:
  - 2                providing a shared location on a computer accessible by at least one  
3                viewer and the instructor to exchange information electronically.
- 1        5. The method of claim 1 further comprising:
  - 2                providing an electronic forum accessible via the computer for sharing  
3                information relative to a particular program among viewers.

1                   6. The method of claim 5 further comprising:  
2                   sorting the information provided by viewers by topics to facilitate  
3                   viewer interaction via threaded electronic discussions.

1                   7. The method of claim 2 further comprising:  
2                   transmitting the viewer identification information and a score based  
3                   on the processing of the responses to an accreditation authority.

1                   8. The method of claim 2 further comprising:  
2                   transmitting the viewer identification information and a score based  
3                   on the processing of the responses to a governmental licensing authority.

1                   9. The method of claim 2 further comprising:  
2                   generating a code based on the viewer comprehension; and  
3                   transmitting the code to the viewer for subsequent submission to a  
4                   licensing authority.

1                   10. The method of claim 2 further comprising:  
2                   repeating at least a portion of the program when the responses indicate  
3                   insufficient viewer comprehension.

1                   11. The method of claim 2 wherein processing viewer identification  
2                   information includes classifying the viewer as a member of one of a plurality of  
3                   predetermined groups and wherein processing the responses includes evaluating  
4                   sufficiency of viewer comprehension based on the group in which the viewer is  
5                   classified.

1                   12. The method of claim 11 wherein the plurality of predetermined  
2                   groups includes students, clinicians, practitioners, and patients.

1                   13. The method of claim 1 further comprising:  
2                   synchronizing presentation of the textual information with the video  
3                   and audio information on the computer of the viewer.

1                   14. The method of claim 1 further comprising:  
2                   synchronizing presentation of the graphical information with the video  
3                   and audio information on the computer of the user.

1                   15. The method of claim 1 wherein processing format information  
2                   comprises:  
3                   identifying a browser being used by the viewer; and  
4                   selecting the transmission format based on the browser.

1                   16. The method of claim 15 wherein the step of selecting the  
2                   transmission format comprises automatically selecting the transmission format.

1                   17. The method of claim 1 wherein the step of selecting the  
2                   transmission format comprises:  
3                   providing the viewer with a selection of the plurality of predetermined  
4                   transmission formats; and  
5                   processing input from the viewer to select the transmission format.

1                   18. The method of claim 1 wherein the step of selecting the  
2                   transmission format comprises:  
3                   determining connection speed of the computer; and  
4                   selecting the transmission format based on the connection speed.

1                   19. The method of claim 1 wherein selecting a method of payment  
2                   comprises:  
3                   searching a database of registered viewers based on the viewer  
4                   identification information; and  
5                   providing access to a subset of programs based on the viewer being  
6                   a previously registered viewer.

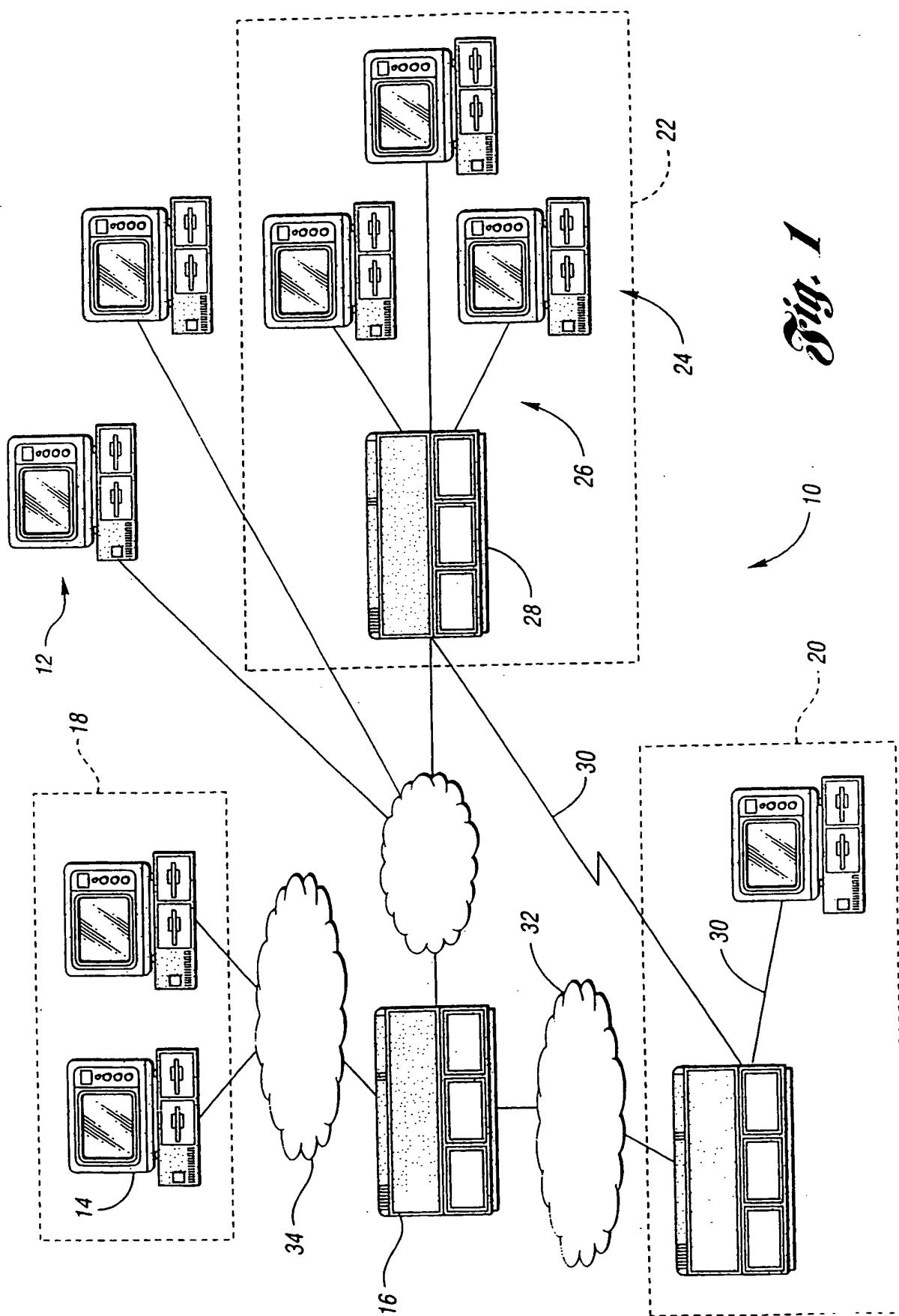
1                   23. The method of claim 22 wherein size of the predetermined  
2 portion is determined based on connection speed of the computer of the viewer.

1                    25. A method for delivery of distance learning information to a  
2                    plurality of viewers, the method comprising:  
3                        providing a plurality of programs accessible via a computer from a  
4                    plurality of remote locations for selection by the viewers, each of the plurality of  
5                    programs including at least two modes of information;  
6                        processing viewer identification information to identify a viewer;  
7                        processing format information to select one of a plurality of  
8                    predetermined transmission formats for the selected program;

transmitting and buffering a predetermined portion of the selected program of a second one of the modes of information in a second bin on the computer of the viewer prior to displaying the program; and

transmitting additional portions of the program while displaying previously transmitted portions of the program on the computer of the viewer.

1                   28. The method of claim 25 wherein the step of synchronizing  
2                   comprises using a pointer to associate presentation of one of the modes of  
3                   information with presentation of another mode of information.



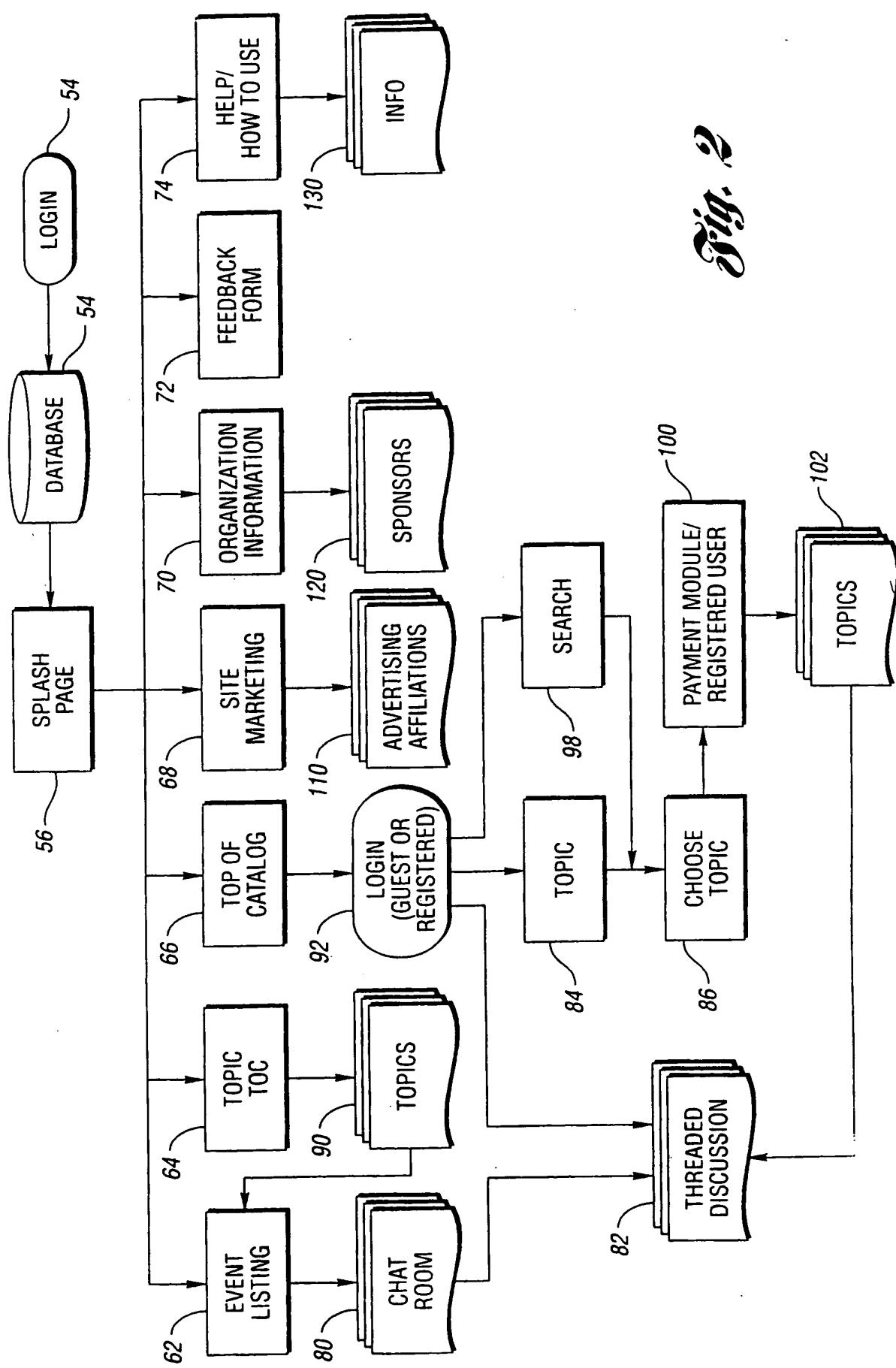


Fig. 2

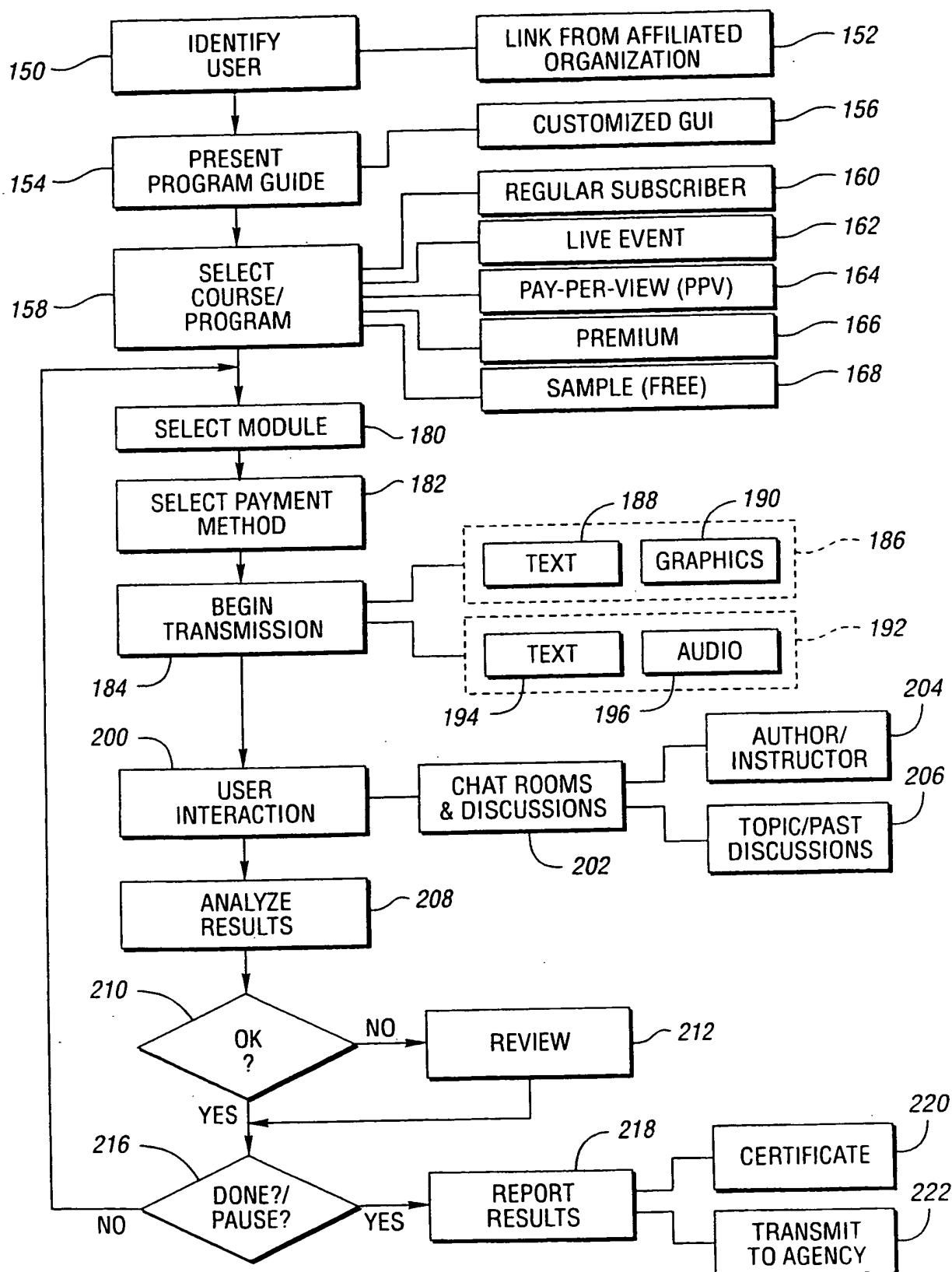
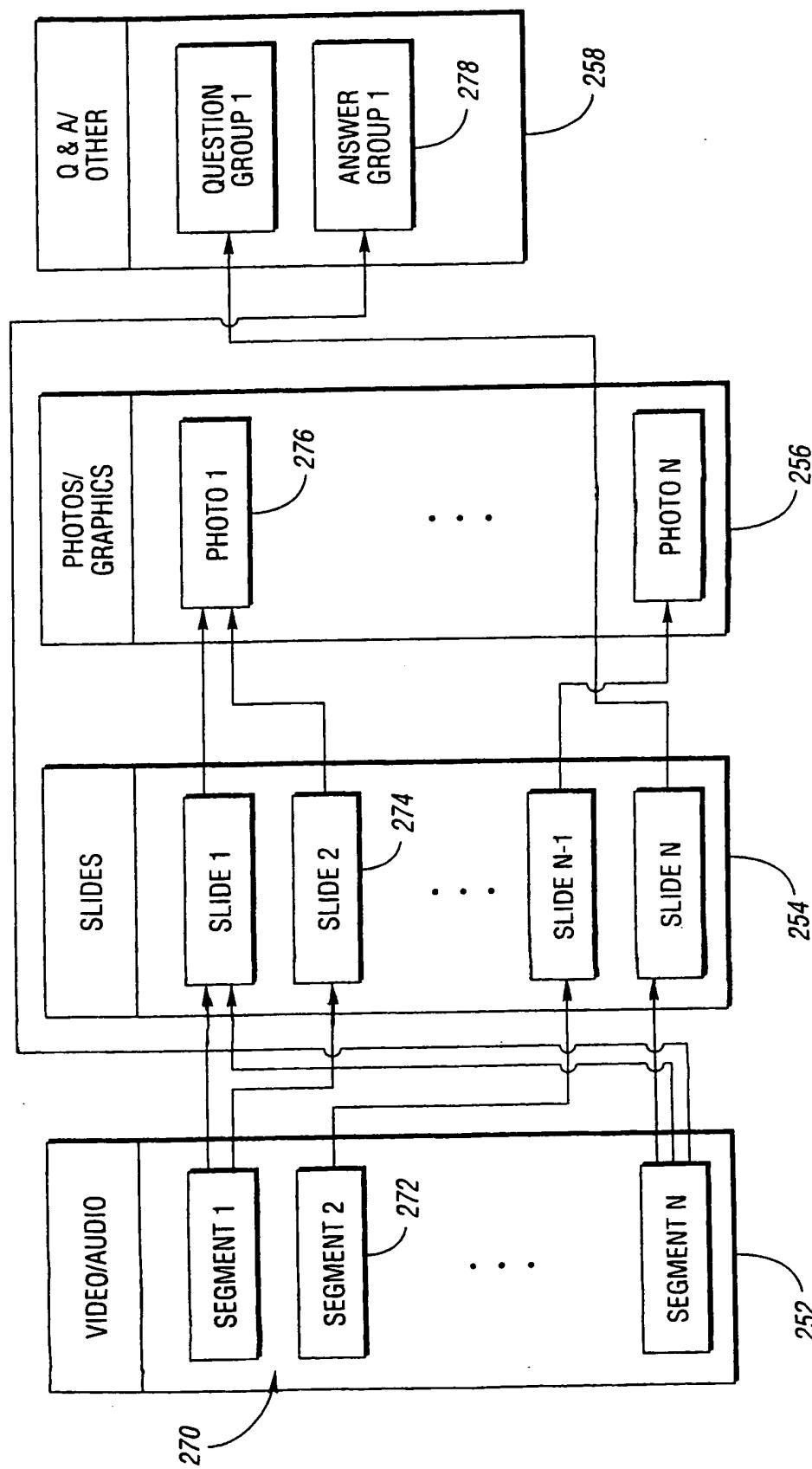


Fig. 3



*Fig. 4*

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/19679

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 G09B/14 G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 G09B G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 44767 A (AGENT BASED CURRICULA INC ;COOK DONALD A (US); PADWA DAVID J (US);) 27 November 1997 (1997-11-27) page 1-12 Entire document ---	1-28
X	WO 99 33041 A (JENKINS WILLIAM M ;MERZENICH MICHAEL M (US); MILLER STEVEN L (US);) 1 July 1999 (1999-07-01) page 1-2; claims 1-13	1-7, 10-14, 22-28
A	---	8,9, 15-21



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

\* Special categories of cited documents :

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Date of the actual completion of the international search

25 September 2000

Date of mailing of the international search report

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 00/19679

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A		8, 9, 15, 17-21

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Int. Appl. No.

PCT/US 00/19679

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